IMAGE PRINTER IIc

Sensible Software, Inc.

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IMAGE PRINTER II
GRAPHICS PRINTING SYSTEM

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1.0 Introduction

This new, improved version of IMAGE PRINTER goes beyond the
capabilities of conventional picture printing programs for the
Apple. Even owners of graphic printer interface cards will find
that IMAGE PRINTER][greatly expands their picture printing
abilities!

IMAGE PRINTER][starts you out on the fast track by helping you
"capture" the HIRES pictures from your favorite programs--even
the copy-protected ones! IMAGE PRINTER][includes a utility
program and detailed instructions to make it simple to capture
pictures from most other programs (including charting programs,
arcade, and adventure games).

IMAGE PRINTER][then helps you customize the picture the way you
want by helping you to add titles, lines, borders, and boxes. You
can even color fill portions of the screen, invert the picture
(like a photographic negative), or scroll the entire picture in
any of four directions! And IMAGE PRINTER][doesn't restrict you
to just one title, you can add text anywhere on the screen, in a
variety of directions.

After you polish your picture, IMAGE PRINTER][makes it particu-
larly easy to select the portion to be printed. IMAGE PRINTER][
uses a unique "graphic window frame" system that can outline the
desired picture section in a matter of a few keystrokes. And
you'll get it right the first time--because you can see what
you're doing right on the screen!

The resulting image can be shrunk to 1/2 size or expanded up to 6
times normal size before being printed. Depending on your printer
type, this means that the final picture size can range from 1.6"
by 2.0" to as large as 14" by 12". IMAGE PRINTER][can also
print your pictures either vertically or horizontally, anywhere
on the printed page.

As yet another benefit, IMAGE PRINTER][is not copy-protected.
This lets you customize the IMAGE PRINTER][programs the way you
want. In fact, instructions are included to show you how to use
IMAGE PRINTER's routines in your own programs.

Even if you have a graphics "dump" interface card for your
printer, you will find IMAGE PRINTER][an excellent enhancement
for your printer. No other program or card gives you IMAGE
PRINTER]['s versatility!

1.1 Hardware Requirements

1. 48K Apple][or Apple][Plus, Apple //e, or other Apple-
   compatible computers.

2. Firmware Applesoft. This is the 'standard' configuration for
   Apple][Plus and Apple //e computers. Apple]['s equipped
   with an Applesoft Firmware (ROM) Card, Apple Language Card, or
   RAM expansion card (such as Andromeda or Microsoft 16K Cards)
   are OK, as are Apple][Plus and Apple //e machines with or
   without Language or RAM expansion card.

3. One or two 5 1/4" disk drives.

4. Printer and printer interface card. A complete list of
   printers and interface cards supported by IMAGE PRINTER is
   provided on a separate sheet.

1.2 Software Requirements

1. Apple DOS 3.3.

If you have HIRES pictures on DOS 3.2 disks, you can use them
with IMAGE PRINTER after converting the files to DOS 3.3. You can
use Apple's 'MUFFIN' program or Sensible Software's SUPER DISK
COPY III to do the conversion. Any HIRES picture that can be
transferred as a 'binary' file onto a DOS 3.3 disk may be
printed.

2.0 Getting Started with Image Printer

2.1 Backing-Up the Image Printer System Disk

IMAGE PRINTER is provided on a standard DOS 3.3 diskette. It is
not protected in any way. Many of the routines on the diskette
are written in Applesoft and may be listed or modified if
desired. Technical details on the IMAGE PRINTER system are pro-
vided in Appendix A, Advanced Programmer Information.

You should create a 'back-up' of the IMAGE PRINTER disk before
using it. This may be done by using the copy program provided on
your DOS 3.3 Master Diskette (COPYA) or by using SENSIBLE
SOFTWARE'S SUPER DISK COPY. Store the original diskette in a safe
place and always operate from the back-up copy.

2.2 How to Execute Image Printer

IMAGE PRINTER may be executed (run) in any of three ways:

1) 'Boot' the IMAGE PRINTER diskette in the normal manner.

   For the usual situation of a disk controller installed in Slot
   #6, type: PR#6 and booting will automatically take place. An
   advantage of 'booting' the IMAGE PRINTER diskette is that a
   special 'Fast DOS' is loaded into memory which will load HIRES
   pictures about three times faster than normal DOS.

   Older 'regular' Apple]['s (not Apple][Plus or //e) do not
   have Applesoft BASIC in ROM as is required for IMAGE PRINTER
   to run. Apple][Plus and //e machines have the necessary ROM
   (firmware) Applesoft as 'standard' equipment. If your
   computer is an Apple][Plus (with or without a Language Card
   or RAM expansion card) OR you have an Apple //e OR your
   regular Apple][is equipped with an Applesoft Firmware (ROM)
   Card in Slot 0, disregard the warning note below:

   #### SPECIAL NOTE FOR APPLE][OWNERS

   > If your Apple][is equipped with an Apple Language
   > Card or a RAM expansion card (16K, 32K, or 64K) from
   > another manufacturer, you must make sure that Apple-
   > soft BASIC is loaded into the RAM space on the card
   > BEFORE you run IMAGE PRINTER. This may be done by
   > either first booting your DOS 3.3 Master Diskette or
   > any other diskette which loads Applesoft into your
   > machine.

2) If DOS 3.3 is already in place, you may run IMAGE PRINTER
   directly. From the Applesoft prompt (]), type: **RUN I/P HELLO.**

3) CALL the appropriate IMAGE PRINTER routines from your own
   Applesoft program. For more information on this technique,
   consult Appendix A, Advanced Programmer Information.

When loading IMAGE PRINTER through the 'HELLO' program (methods 1 and 2 above), you have an opportunity to 'capture' a HIRES image now in memory for later use, and you can signal that you wish to re-configure IMAGE PRINTER to match your hardware combination. For details on these procedures, please read the discussion in section 3.0 of this manual 'Hardware Set-up Procedure'.

Be sure that IMAGE PRINTER is correctly set-up for your hardware! Improper configuration will result in incorrect or no printouts! As initially shipped, IMAGE PRINTER is set up for an Epson MX-80 and an Apple Parallel Card in Slot 1.

2.3 The 'Main Menu'

Once IMAGE PRINTER is running, you will see this display:

```
         IMAGE PRINTER      COPR. 1983, ALL
    SENSIBLE SOFTWARE,INC. RIGHTS RESERVED

               VERSION 2.X

    THE AVAILABLE OPTIONS ARE:

    A = ANNOTATE (ADD TEXT TO) PICTURE
    B = FORM A LINE BOX ON THE PICTURE
    C = COMPRESS PICTURE NOW IN MEMORY
    D = LOOK AT DOS CATALOG
    F = COLOR FILL A PICTURE AREA
    G = GET (LOAD) PICTURE FROM DISK
    I = INVERSE OF PICTURE NOW IN MEMORY
    L = DRAW FREE-FORM LINES ON PICTURE
    M = SET PRINTOUT MAGNIFICATION
    P = PRINT PICTURE NOW IN MEMORY
    S = SAVE PICTURE TO DISK
    T = TRANSLATE (SCROLL) PICTURE
    V = VIEW PICTURE NOW IN MEMORY
    W = WINDOW PICTURE (SET ACTIVE AREA)
    X = EXIT IMAGE PRINTER

    WHICH OPTION (RETURN FOR MENU)?
```

This display is called the "Main Menu". It gives you a number of choices for what you want to do next. Many of the Options in the list above are self-explanatory but some deserve extra comments to help you learn to run IMAGE PRINTER effectively.

2.4 Image Printer Conventions

o All Main Menu items require only a SINGLE keystroke response, and the 'RETURN' key is NOT required. Rather, pressing only the 'RETURN' key will re-display the Main Menu.

o Some choices require additional information. Generally, a secondary, or 'sub-menu', is provided to prompt you for the needed data. Again, only SINGLE keystrokes are required for action.

o The only questions NOT answered with a single keystroke are those asking for a DOS file name (a picture file, for example), and those requesting a number greater than one digit (a left margin, for example).

o Most prompt questions have a 'standard' response built in which you can choose by pressing the 'RETURN' key. The standard 'answer' is the number or letter under the Apple flashing box 'cursor'. You can always 'override' the standard response by choosing a number or letter as suggested from the menu or prompt message text.

IMAGE PRINTER protects you from making bad responses to prompt questions by only accepting keyboard entries that result in correct results.

o You may 'quit' an Option, including a printout, at any time by pressing the 'ESC' key anywhere a single keystroke is expected. After an ESCape, you are returned to the Main Menu.

o Picture editing commands that permanently (and irrevocably) alter a picture (Options A, B, C, F, and T) ask for confirmation of the change (OK? **Y/N**). There is no 'standard' value here, you MUST press either 'Y'(es), 'N'(o), or 'ESC' (same as 'no').

The part of the IMAGE PRINTER manual devoted to describing the Main Menu Option choices is divided into sections, according to the function of the commands being explained. These groups are listed here and in the Table Of Contents for your convenience:

o 4.0 DOS INTERFACE-LOADING AND SAVING PICTURES
   (Options D, G, S)

o 5.0 VIEWING, SETTING UP, AND PRINTING PICTURES
   (Options V, M, P, W)

o 6.0 HIRES PICTURE EDITING COMMANDS
   (Options A, B, C, F, I, L, T)

o 7.0 OTHER COMMANDS
   (Option X)

2.5 Using the Image Printer Graphics Cursor

A special feature of IMAGE PRINTER is the ability to perform all
picture editing and printout 'window' selections right on the
graphics screen. When choosing an Option which needs some
graphics screen information, you will be using the IMAGE PRINTER
'graphics cursor'.

This graphics 'cursor' is used when executing any of the HIRES
picture 'editing' commands. Commands using this feature are
Annotate (Option A), Form A Line Box (Option B), Color Fill A
Picture Area (Option F), Draw Free-Form Lines, (Option L), and
Window Picture (Option W). Details on what each of these options
do are given later in this manual.

The 'graphics cursor' is really just a large 'cross' drawn on the
screen which shows the current pointer position. You can move it
around on the screen using the I, J, K, and M keys. Pressing one
of these keys moves the cursor just one HIRES 'dot' per key
press. If you want to move around your picture more rapidly, hold
down the 'CTRL' key while pressing one of these keys. You may
also use the 'REPT' key to move easily around the screen.

To get to the margins of the HIRES screen quickly, you can use
the 'special move' keys: 'L' moves you to the left margin and 'R'
moves to the right margin. Likewise, 'U' goes up to the top of
the screen and 'D' down to the bottom. Pressing 'C' moves the
cursor to the center of the screen.

Once you have placed the cursor where you want it, type a 'P' to
indicate you want to quit moving and make a pick. If you should
decide not to complete a graphics 'pick', just press the 'ESC'
key to return to the Main Menu.

Many of the options ask you to select an area of the screen to
worked on. For example, you use the Window Option to choose what
section of the screen should be printed. Basically, you are
building an imaginary rectangle by pointing at the opposite
corners of the rectangle. This is done by picking one of the
corners and then the opposite corner. For example, first pick the
upper left corner and then the lower right corner.

```
1st cursor
   pick ------->  x..............................
                  :                              :
                  :                              :
                  :                              :
                  :             imaginary        :
                  :             rectangle        :
                  :                              :
                  ..............................x <-- 2nd cursor
                                                      pick
```

After the first corner of the rectangle has been 'picked', you
will see the message:

PICK 2ND SCREEN CORNER - PRESS SPACE BAR TO BEGIN.

This confirms that the computer accepted your first corner, press
the Space Bar to bring the cursor back up. Then, moving the

cursor around with the same keys as before, and pick the opposite
corner of the screen area you want to use. Again, use the 'P' key
to tell IMAGE PRINTER you've picked a corner. Of course, you may
also use the 'ESC' key to return to the Main Menu if you decide
not to complete the process. Use of the 'ESC' key keeps your
previously chosen active screen size, even if you escape on the
second cursor pick.

This method of picking a rectangle is used when drawing 'boxes'
on the screen (Option B), filling screen areas with color (Option
F) and 'cropping' a picture prior to printing it (Option W).

Any time the graphics cursor is displayed, you can type an 'F' to
reset the active screen area to the full 280 by 192 HIRES size.
This is the easiest way to select the entire picture without
having to manually move the cursor to opposite corners of the
screen. Because it is too easy to 'wipe out' an entire picture
when color filling, the 'F' full-screen cursor mode is not avail-
able in this option.

When adding text to a picture, you will be using the graphics
cursor to select the spot where text is to begin. In the 'line
draw' Option L, you will be picking each point to be connected
with straight line segments.

Each time you enter an option that uses the graphics cursor, you
are shown the following screen:

```
PLOTTING LIMITS ARE PICKED GRAPHICALLY

USE I/J/K/M, 'CTRL' I/J/K/M & L/R/U/D/C
KEYS TO MOVE THE GRAPHICS CURSOR

I=MOVE UP      1    CTRL I=MOVE UP     10
J=MOVE LEFT    1    CTRL J=MOVE LEFT   10
K=MOVE RIGHT   1    CTRL K=MOVE RIGHT  10
M=MOVE DOWN    1    CTRL M MOVE DOWN   10

L=GOTO SCREEN LEFT R=GOTO SCREEN RIGHT
U=GOTO SCREEN TOP  D=GOTO SCREEN BOTTOM
C=GOTO CENTER SCREEN

TYPE F FOR FULL 280 X 192 SCREEN
TYPE B FOR 'BLANK' POINT (OPTION L)
TYPE P TO INDICATE A 'PICK'

PRESS ESC KEY TO QUIT & RETURN TO MENU
```

This display is to remind you what options are available during
the process. After you are through reviewing the commands press
the Space Bar to proceed to locating the graphics cursor on the
screen.

3.0 Hardware Set-Up Program

IMAGE PRINTER features an easy-to-use, one-time hardware config-
uration program. Invoked from the IMAGE PRINTER 'HELLO' program
(I/P HELLO), the set-up program allows you to specify which
printer you have, and the printer interface card you're using.
Also, you can control such functions as a linefeed after carriage
return (for dot-matrix printers), number of disk drives (single
or dual), and whether you wish to use a special 'custom' printer-
driver program. Plus, the I/P HELLO set-up procedure can be used
to 'capture' HIRES Page 1 for use by IMAGE PRINTER (which uses
Page 2 at all times).

While The IMAGE PRINTER 'HELLO' program is loading in several
required machine-language files, you can request the set-up pro-
cedure by pressing the 'ESC' key. This is immediately acknow-
ledged by the message **'CHANGE IN SET-UP REQUESTED - STAND BY'**. A
short time later, you will see a short 'menu' of choices:

```
THE AVAILABLE OPTIONS ARE:

1 = SAVE HIRES PAGE 1
B = 'BSAVE' PICTURE TO DISK
R = RUN IMAGE PRINTER NOW
S = CHANGE HARDWARE SET-UP
V = VIEW HIRES PICTURE NOW
X = EXIT TO APPLESOFT NOW

WHICH?
```

If you prefer, you can 'cancel' a request for changing the hard-
ware or set-up and go directly to IMAGE PRINTER by choosing 'R'
when the above menu is shown. Or, by pressing 'X', you can 'quit'
entirely and return to normal Applesoft.

3.1 'Capturing' Hires Pictures

Selecting '1' in the above menu transfers a picture now in HIRES
Page 1 (beginning at $2000, 8192 decimal) to HIRES Page 2 ($4000,
16384 decimal) before starting execution of the main IMAGE
PRINTER program. A picture already stored in Page 2 does not need
to be moved. One reason for setting up pictures this way is when
you cannot 'save' (using a DOS 'BSAVE') a picture on disk before
running IMAGE PRINTER (for example, from a 'protected' disk game
or utility program).

IMAGE PRINTER does not 'load' a picture from disk as it begins
running. Rather, whatever is in memory is used. HIRES Page 2 is
used as the 'primary' page with Page 1 as a temporary picture
location. This gives you the ability to veto an 'editing' change
to your pictures. See the section entitled HIRES Picture Editing
Commands for details.

Pressing 'B' from the 'HELLO' menu allows you to 'save' a picture
in either HIRES page to disk before (or instead of) running IMAGE
PRINTER. You have the choice of specifying Page '1' or '2', or
'ESC' to go back to the 'HELLO' menu without saving a picture.

If you press 'V', you can view either HIRES page easily without
having to know a long set of exotic 'POKES'. Then, if you see
what you want, you can 'transfer' a Page 1 picture to Page 2 for
use by IMAGE PRINTER, (press '1' in the 'HELLO' menu) or 'save'
the picture(s) for later use (press 'B').

Several techniques for 'capturing' pictures from 'protected' game
and business software are presented in Appendix B, Techniques For
'Capturing' Pictures.

3.2 The Hardware Set-Up Program

Pressing 'S' begins execution of a special 'set-up program,
allowing you to describe your printer and interface card type and
brand. Unless you change equipment, you only have to perform the
following steps once. IMAGE PRINTER 'remembers' what hardware you
have and loads the appropriate software each time.

The hardware set-up program begins by displaying a list of equip-
ment as last defined. If you have not yet configured IMAGE
PRINTER, the 'standard' set-up will be: 1) Epson MX-70/80/80FT/82
(GrafTrax or GrafTrax+), 2) A 'standard' Parallel interface card,
(Apple Parallel) installed in Slot #1, 3) Dual disk drives, 4) A
line feed after carriage return desired, 5) Paper width of 8",
and 6) a 'delay' of zero (0) seconds after each line is printed.

You are then asked: **'MAKE (MORE) CHANGES? Y/N'**. If the displayed
hardware combination does not match your equipment, answer
'Y'(es) to begin the re-configuration process.

Since some of the displays to gather the required hardware infor-
mation are quite lengthy, they are not reproduced here, but
summaries of their function are included as reference.

IMAGE PRINTER supports many popular printers under two cate-
gories: 1) Dot-matrix printers such as Epson, NEC PC-8023, Apple,
PROWRITER, and others, and 2) Letter-quality (so called 'daisy
wheel') printers such as Diablo, NEC Spinwriter, Qume, Apple,
Starwriter, and others. You should answer either 'D' (for dot-
matrix) or 'L' (for letter-quality).

Depending on your answer, printers supported by IMAGE PRINTER are
listed so that you can make your choice. Generally, only the
printers listed will run with IMAGE PRINTER, but many times
similar printers are sold under a variety of brand names even
though they are manufactured by the same company and operate the
same (for example, NEC PC-8023 and C.ITOH dot-matrix printers).

If you know that your printer operates identically to one
supported by IMAGE PRINTER, everything should work OK.

Owners of NEC Spinwriter letter-quality printers need to be aware
that there are two possible printer command schemes, depending on
the model Spinwriter you own. One is the so-called NEC 'protocol'
and the other is 'Diablo-compatible' print protocol. Consult your
owners manual and the list of Spinwriter models supported by
IMAGE PRINTER if you are not sure which you have. And, if one
print protocol configuration of IMAGE PRINTER does not give
correct results, try the other listed (that is, switch from NEC
to Diablo protocol, or vice versa).

Again, depending on your choice of dot-matrix or letter-quality
printer, you are presented with a list of supported printer
interface cards. The list of Parallel cards available for dot-
matrix printers is extensive (sorry, no Serial cards here). For
letter-quality printers, **ANY** interface card, Serial or Parallel,
will work correctly. Naturally, the card type must match the
printer (Serial card with Serial printer, Parallel card with
Parallel printer).

In addition to 'standard' printer interface cards (those with a
'firmware' ROM included which are 'turned on' with PR#), IMAGE
PRINTER supports user-written 'driver' routines. Use of a driver
routine, while admittedly an advanced technique for a new user,
will enable almost any interface card to be used with IMAGE
PRINTER. To be used, a driver program <u>MUST</u>:

1) Be written in machine language.
2) Use ONLY the memory range $300 to $3CF (768 to 975 decimal).
3) Initialize the printer card used with a machine language jump
   subroutine (JSR) to $300.
4) Print a character pushed (PHA) on the 6502 'stack' via a
   machine language jump (JMP) to $303.
5) Be available on the IMAGE PRINTER System Disk under the DOS
   file name <u>'USER-DRIVER'</u>. You can satisfy this requirement by
   just copying your driver routine binary file to the IMAGE
   PRINTER disk.

Whether a 'standard' interface card or user-driver is used, you
must enter the 'slot' your printer card is in. Initially, the
standard value is Slot #1, the normal location of a printer card
in the Apple. If your card is NOT in Slot #1, be sure to
correctly enter the slot or IMAGE PRINTER will 'hang' when you
attempt to print a picture, necessitating an intentional 'RESET'
to recover control of your Apple.

IMAGE PRINTER accommodates dual disk drive Apples by asking for a
drive number (1 or 2) each time disk access is requested (for
loading or saving pictures, or for looking at the DOS catalog on
a disk). If your Apple has only one drive, you can avoid always
selecting drive #1. To do this, answer 'N'(o) to the set-up
question **'DUAL DISK DRIVES INSTALLED? Y/N'**

If you are configuring IMAGE PRINTER for a dot-matrix printer and
Parallel interface card, you are asked the extra question **LINE
FEED AFTER CARRIAGE RETURN? Y/N**. Normally, printers are set up to
line-feed only when the application program sends a 'LF' char-
acter (ASCII 10). This is the 'standard' case with IMAGE PRINTER.
But, if your pictures turn out with blank spaces between lines,

then your printer is inserting its own linefeeds, thus double-spacing. You can turn off the extra LF's by answering 'N'(o) to the above question.

Recognizing that users may want to vary the width paper they are using, IMAGE PRINTER needs to know what size you are now using. Among other things, the size is used to properly position (center or right justified) a picture on the page, and it prevents printer errors caused by attempting to print pictures too wide. The initial 'standard' value is 8 inches, the actual usable width for most printers taking 8 1/2 inch paper. If yours is a wide carriage printer (all letter-quality machines, and dot-matrix printers such as the Epson MX-100 or PROWRITER II), then you may specify paper up to 14 inches wide.

Lastly, you can specify a timed 'delay' after each line is printed. The prompting message is: **'DELAY AFTER CR (* .1 SEC, 0 NOW)'**. You can set any delay desired from 0 to 127 (12.7 seconds) in increments of one (.1 seconds actual). A delay is useful if you are afraid of overheating your dot-matrix printhead or if you are experiencing 'missed' characters in the printout (the delay gives the printer a chance to 'catch up'). If you want the last used (standard) value, press the 'RETURN' key, otherwise enter the delay number you want to use.

This concludes the set-up questions. Each time you go through all the questions, IMAGE PRINTER re-displays your current answers and again asks **MAKE (MORE) CHANGES? Y/N**. Should something not look right to you, answer 'Y' and you can re-specify all parameters, including a change from letter-quality to dot-matrix, or vice versa. Once everything properly matches your hardware, answer 'N' and the changes will be recorded. You will see the message **'MODIFYING SYSTEM - PLEASE STANDBY'**. IMAGE PRINTER is then started automatically. A small Apple TEXT file, 'S' for Set-up, is written onto your disk with your particular configuration information. Whatever you do, **do NOT 'DELETE' this file!** If you do, your set-up is lost and IMAGE PRINTER will revert to its standard condition, which probably won't be right for you.

Remember, you do **NOT** have to re-configure the program each time you run it. But, should you wish to change your hardware set-up, or if you want to 'save' or 'view' a HIRES image, just press 'ESC' while the 'HELLO' program is loading files.

For your convenience, a complete list of printers and interface cards supported by IMAGE PRINTER is printed on a separate card.

4.0 DOS Interface—Loading and Saving Pictures

4.1 Option D: Look at DOS Catalog

Option D is used to take a look at the directory or CATALOG on
the disk(s) you are using. If IMAGE PRINTER is configured for
dual-drives, you are asked the additional question **'CATALOG DRIVE
1 OR 2?.** The number under the flashing cursor indicates the
standard choice if you press only the 'RETURN' key, and is the
last drive accessed (1 at the start of the program). Type a
single number if you do not want the standard (or last used)
value.

Single disk drive users get an immediate CATALOG upon selecting
Option D.

4.2 Option G: Get (Load) Picture from Disk

No picture is automatically loaded into memory when IMAGE PRINTER
is first run. The 'HELLO' program can be set to 'capture' a
picture from HIRES Page 1 or start with whatever is in Page 2 (if
anything). Depending on whether there is a picture in memory when
you ask for a 'View', you may be looking at random 'junk' until a
picture is loaded from disk.

Pictures are loaded from your disks with Option 'G'. Pressing 'G'
from the Main Menu will display the prompt:

```
LOAD WHAT PICTURE?  (RETURN FOR CATALOG)

NAME? ..............................
```

Here, you can type in the name of a HIRES picture you have
previously BSAVEd to disk (or 'saved' to disk with the IMAGE
PRINTER 'S' command). If you've forgotten the exact name (and you
also forgot to use the 'D' Look At DOS Catalog Option), just
press the 'RETURN' key instead. As in Option D, you see the
message **CATALOG DRIVE # 1 OR 2?.** Press 'RETURN' for the standard
drive catalog, or enter a number (1 or 2). If you decide you
really don't want to load a new picture from disk, press the
'ESC' key to return to the Main menu (single disk drive users
must use a '!' as a file name to signal an 'escape').

Whether or not you ask for a catalog, dual-drive users are asked
for which disk drive to load the picture from. This is useful
even though you just looked at a catalog since you may decide now
not to load a picture, or you may find that it was the other disk
drive you really wanted to load from. Again, press 'RETURN' to
use the last disk drive accessed, a single number or the 'ESC'
key.

Any legal DOS file name up to thirty characters long (except colons) may be used.

If you have not signaled for a return to the Main Menu, you will see the message LOADING 'file name'--where 'file name' is the name of the picture you asked to be loaded. If for some reason IMAGE PRINTER can't find 'file name' on the desired disk or if some other problem prevents proper loading, you will be given an message explaining the error and returned to the Main Menu.

Pictures that were originally 'saved' to disk from IMAGE PRINTER re-load with the same 'window', plot size and mode (horizontal or vertical) as you had originally defined.

4.3 Option S: Save Hires Picture to Disk

You can 'save' the currently active picture to a disk file with Option S. This is particularly useful if you altered a plot using any of IMAGE PRINTER's many picture editing commands. Like the 'Get Picture' command (Option G, described above), you are asked for a file name for your picture, and you can look at your disk's catalog before saving if desired. On the other hand, if you want to 'abort' without saving a picture, press 'ESC' when asked 'which drive' to use (enter a '!' for the file name if you are set-up for single disk drive operation).

Otherwise, any legal DOS file name up to thirty characters (except colons) long may be used.

The picture 'cropping' you have defined, the picture size selected, and the plotmode for your picture (horizontal or vertical on the paper) are all saved along with the picture to save you time should you wish to re-load the file and print it again.

If there is some reason why IMAGE PRINTER cannot successfully 'save' your picture (DISK FULL for example), you are given an appropriate error message and be returned to the Main Menu for your next choice.
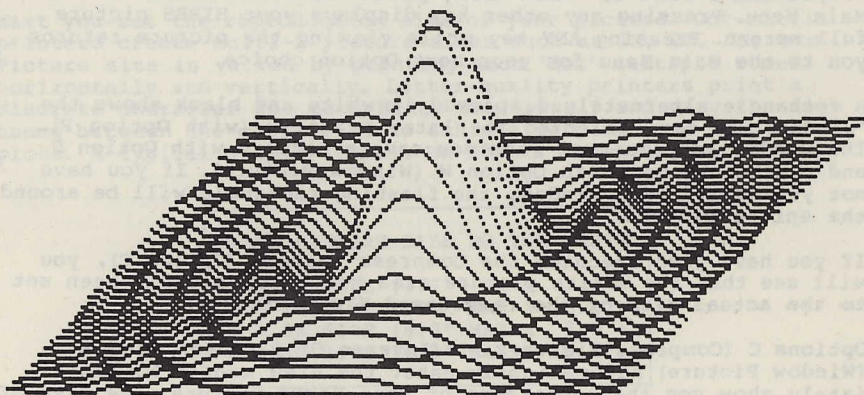
5.0 Viewing, Setting Up, and Printing Pictures

5.1 Option V: Viewing A Picture

The HIRES picture currently loaded into IMAGE PRINTER can be
'Viewed' with the 'V' command. Please note that if no picture has
been loaded via the 'G' (GET) command, you are looking at what-
ever was leftover in the graphics area of your Apple's memory.
(If you have instructed the IMAGE PRINTER 'hello' program to save
a 'Page 1' picture or if you intentionally left a picture in
'Page 2', it is still available). IMAGE PRINTER never clears the
picture unless you so instruct.

A variety of information about your picture is presented when you
select the V Option. This is to remind you of several important
parameters for a printed picture. A typical display is re-printed
here (items on right side of the equal signs will vary depending
on what options you have set):

```
┌─────────────────────────────────────────────────────┐
│  PICTURE PARAMETERS NOW SELECTED                      │
│                                                       │
│  PLOTMODE SELECTED       = H                          │
│  PICTURE SIZE NO.        = 1                          │
│  ACTUAL LEFT MARGIN      = 1.7"                       │
│  FINISHED PICTURE SIZE   = 4.7" X 2.6"                │
│                                                       │
│  DURING VIEWING A FLASHING RECTANGLE                  │
│  WILL SHOW THE SIZE OF THE PICTURE                    │
│  AREA SPECIFIED FOR LATER PRINTING                    │
│                                                       │
│  PRESS SPACE BAR TO VIEW THE PICTURE                  │
│  PRESS ESC TO QUIT NOW & RETURN TO MENU               │
│                                                       │
│  PRESS SPACE BAR WHILE VIEWING THE                    │
│  PICTURE TO RETURN TO THE MENU                        │
└─────────────────────────────────────────────────────┘
```

If you don't want to 'View' now, press 'ESC' to return to the
Main Menu. Pressing any other key displays your HIRES picture
full screen. Pressing ANY key while viewing the picture returns
you to the Main Menu for your next Option choice.

A rectangle alternately displayed in white and black shows the
'window' you have selected for later printing (with Option P).
The window is preserved when you save a picture with Option S,
and can be changed with Option W (Window Picture). If you have
not yet specified a window, the flashing rectangle will be around
the entire picture.

If you have just executed the Compress feature (Option C), you
will see that the active picture area has automatically been set
to the actual size of the compressed HIRES picture.

Options C (Compress Picture), I (Inverse Of Picture), and W
(Window Picture) automatically enter the View module to immed-
iately show you the appearance of your HIRES picture, the size of
the final print-out, and the current screen window selected.

5.2 Option M: Set Printout Magnification

You have full control over what size your final printed picture
will be, the placement of the image on the paper, and the orien-
tation of the printed picture (horizontal or vertical on the
paper). In addition, IMAGE PRINTER gives you full control over
the area of the HIRES screen to be used for plotting on your
printer. Option W, 'Window Picture', is used to 'crop' the
picture to include only the area you want to print. A special
feature of IMAGE PRINTER is a fully-graphical method of defining
the HIRES screen 'window' to be printed (explained fully under
Option W).

When you press 'M' from the Main Menu, you are shown three sub-
menus to allow quick and easy setting of all printout parameters.
The menus let you specify: 1) The orientation, horizontal or
vertical, of the picture on the paper, 2) The size of the
finished plot, and 3) The position of the picture on the paper.
The actual appearance of the displays varies somewhat depending
on which printer you are using, but typical displays are re-
created below to give you an idea of what to expect. First,
select which orientation (plot mode) you want:

```
┌─────────────────────────────────────┐
│                                     │
│   WHICH PLOT MODE DO YOU WANT?      │
│                                     │
│   H = PLOT HORIZONTAL ON PAPER      │
│   V = PLOT VERTICAL   ON PAPER      │
│                                     │
└─────────────────────────────────────┘
```

You may mix plots printed in either mode on the same page. De-
pending on the particular printer you have, you may find that
pictures printed in one orientation or the other appear to have a
bad height-to-width (aspect) ratio. They may be elongated hor-
izontally (shortened vertically) or may appear too tall (short-
ened horizontally). Please note that this is **NOT** a defect in
either IMAGE PRINTER or in your printer. Differences occur since
individual 'dots' on the paper are not always the same distance
apart across the paper as down the page.

Next you set the reproduction size of your picture. Dot-matrix
printers create multi-X picture sizes such as 1X, 2X, 3X, etc.
Picture size is varied by printing each 'dot' multiple times
horizontally and vertically. Letter-quality printers print a
discrete character for each HIRES dot (pixel) and vary the dis-
tance between the characters to achieve varying size output
plots. A typical display (Epson MX-80) is shown below:

```
┌─────────────────────────────────────┐
│                                     │
│  WHAT PICTURE SIZE DO YOU WANT?     │
│                                     │
│  1 = 1X SIZE (4.7"    X    2.6")    │
│  2 = 2X SIZE (8.0" MAX X    5.3")   │
│  3 = 3X SIZE (8.0" MAX X    7.9")   │
│  6 = 6X SIZE (8.0" MAX X   16.6")   │
│                                     │
└─────────────────────────────────────┘
```

The sizes given in the sub-menus above assume a full 280 X 192
'dot' HIRES screen will be printed. Actual output size is propor-
tional to the size of the print 'window' you have defined.
Picture 'size' is set to '1' (Single) initially. Use this value,
or type a single number to indicate your choice.

You may not be able to print an entire 280 by 192 HIRES picture
in every size. If the selection menu has the word 'MAX' in the
size you want, it means that full screen pictures cannot be
plotted in that size and orientation. Length of picture down the
paper is not limited. If you do not 'crop' your picture (Option
'W'), its size will be automatically cut down so it will fit.

Lastly you must define picture placement on the paper:

```
WHICH PICTURE PLACEMENT DO YOU WANT?

L = LEFT    JUSTIFIED ON THE PAPER
C = CENTER JUSTIFIED ON THE PAPER
R = RIGHT  JUSTIFIED ON THE PAPER
U = USER    SPECIFIED PLACEMENT
```

The standard value, 'Center Justified' when IMAGE PRINTER is
first run, may be selected by pressing the 'RETURN' key. Or, you
may press 'L', 'C', 'R', or 'U' to indicate your choice.

Several factors affect where a printed picture is actually placed
on the paper, such as the width paper you are using, and the
amount of the picture you want to print (the 'window'). IMAGE
PRINTER allows you to specify paper width as part of its 'set-up'
program (also used to configure IMAGE PRINTER for your printer
and printer interface card). You may also want to adjust the
'tractors' on the printer slightly left or right.

For best results when printing graphics always use fan-fold
tractor feed paper. Do NOT use the friction feed capability of
your printer even if so equipped, since vertical paper movement
is not precise and results in bad plots.

If you ask for 'user specified' placement ('U'), you must type in
the exact left margin (in inches) desired. A message similar to
'LEFT MARGIN? (MAX = 2.1)' appears. You cannot set a margin that
would result in the picture being too wide to print.

Letter-quality printer users must specify which printable char-
acter to use for 'color' (non-black) 'dots' in a picture, and for
the black parts. The initial 'standard' 'color' character is a
period (.) and the 'black' pixel character is a blank space ( ).
You will see messages like the ones here:

```
'COLOR' PRINT CHARACTER (ASCII=46) ?.
'BLACK' PRINT CHARACTER (ASCII=32) ?
```

Press the 'RETURN' key to accept the character under the cursor
or type in a single character ('RETURN' not necessary). Note that
you can effectively 'inverse' a picture by reversing the 'color'
and 'black' character choices. Any 'printable' (non-Control)
character may be used.

Depending on how much of a HIRES image you select for printing
and the plot size you desire, it may be possible to print two or
even three individual plots side by side on the paper, and next
to each other going down the page. To do this, use 'Left' justi-
fication for the first, 'Center' for the second, and 'Right'
justification for the third. After each plot is finished, turn
the platen knob counter-clockwise to manually back up the paper,
guiding the paper out of the printer with your other hand.

Major printout parameters, such as size and placement, are dis-
played after you finish defining them, and each time you ask to
'View' your pictures (Option V) or ask to print it (Option P). An
example display is included here:

```
PICTURE PARAMETERS NOW SELECTED

PLOTMODE SELECTED       = H
PICTURE SIZE NO.        = 1
ACTUAL LEFT MARGIN      = 1.7"
FINISHED PICTURE SIZE   = 4.7" X 2.6"
```

5.3 Option P: Print Picture Now in Memory

Selecting Option P readies your picture for printing. It is most
important that all appropriate printout parameters be set before
you execute this option. This means, among other things, that
'Inverse' or 'Normal' picture mode is proper for the type of
image you want to print, and that picture size, placement on the
paper (left, center or right justified) and plot mode (horizontal
or vertical plot on the paper) are selected to your liking. And,
of course, IMAGE PRINTER must be correctly configured for your
printer and interface card set-up.

If you are unsure of anything mentioned above, be sure to consult
the discussions in this manual under Option M (Set Printout
Magnification) and Section 3.0 (Hardware Set-up Program) before
proceeding.

When 'P' is pressed from the Main Menu, the text screen of the
Apple clears and you are shown the printout parameters you have
defined (in a display similar to the one re-printed in the Option
M section of this manual). Also, you will see the message:

```
PRESS SPACE BAR TO START/STOP PRINTOUT
PRESS ESC KEY TO QUIT & RETURN TO MENU
```

The message above gives you an idea of what happens during the
printing process. IMAGE PRINTER has a special feature, called
'pause-print', which allows you to start and stop the printing of
your picture just by pressing the 'SPACE BAR' on the keyboard. At
the start of a printout, you must press the 'SPACE BAR' to have
things start.

Then, assuming the key you pressed was other than the 'ESC' key
(at which time you'll be returned to the Main Menu for another
Option pick) your printer should start up and begin to plot your
picture. Should you desire to suspend printing, press the 'SPACE
BAR'; to re-start again, press the 'SPACE BAR' again. The pause-
print feature is very useful for temporary stops to inspect your
plot, and to stop all of the noise if the telephone should ring!

During printing, your picture is displayed on the Apple's HIRES
screen. A rectangle is drawn on the screen (but NOT printed)
showing the area to be printed. Additionally, stripes are drawn
through the picture as each line of the picture is sent to your
printer. The stripes are drawn vertically on the screen for
vertical plot mode print-outs, and horizontally when a horizontal
plot mode has been specified. These visual aids help you to know
that all is progressing as planned.

What happens if you don't like the appearance of the plot after
it has started? Easy, just press the 'ESC' key (while things are
printing or while the printer is quiet) and you will 'quit' the
print Option.

After your printed picture is done, you can have the printer
paper positioned to the 'top' of the next page ready for a new
plot. Since printing graphics sometimes destroys the printers
'top-of-form' ('TOF') position, a counter is kept allowing line-
feeds to take the place of 'TOF'. Proper placement of the paper
is made even if you quit printing a picture early with the 'ESC'
key. You will see the question **SET PAPER AT TOP OF NEXT PAGE?
Y/N.**

If you type 'Y', the paper is automatically moved so that the
printhead is in the same position on the next sheet as it was
when your picture began. Pressing the 'RETURN' key or typing 'N'
returns you to the Main Menu and the paper remains where it was.

What if nothing happens when you signal 'ready to begin'? Or the
plotted picture really looks weird? There's no need to panic!
Chances are you forgot to set your printout parameters with
Option 'M' or IMAGE PRINTER is not set up for your printer/inter-
face card combination (better use the Set-Up Program here). Or,
maybe your printer is 'off-line'. Check everything out and try
again. (If you must press the RESET key to regain control of your
Apple you will have to re-run IMAGE PRINTER before continuing).

5.4 Option W: Window Picture (Set Active Area)

IMAGE PRINTER gives you full control over how much of a HIRES
picture will be printed. This process, called 'cropping' or
'windowing', is done right on the graphics screen, using a
'graphics cursor' to define opposite corners of the screen area
you want printed. This technique is explained fully in Section
2.5 (Using The Graphics Cursor).

The 'graphics cursor' is really just a large 'cross' drawn on the
screen which shows the current pointer position. You can move it
around at will using the I, J, K, and M and CTRL-I, J, K, and M
keys. To get to the margins of the HIRES screen quickly, you can
use the 'special move' keys: 'L' (move to the left margin), 'R'
(move to the right margin), 'U' (move up to the top of the
screen), and 'D' (move down to the bottom of the screen). Press-
ing 'C' moves the cursor to the center of the screen.

Once you have positioned the cursor, type a 'P' to indicate you
want to quit moving and make a pick. If you should decide not to
complete picking a screen area for printing, just press the 'ESC'
key to return to the Main Menu. Select the other corner of the
desired print 'window' in a like manner.

Any time the graphics cursor is displayed, you can type an 'F' to
reset the active screen area to the full 280 by 192 HIRES size.
This is the easiest way to select the entire picture without
having to manually move the cursor to opposite corners of the
screen.

If you try to specify too large an area for the size and orien-
tation defined for you printout, you'll see this warning:

```
WARNING - FINISHED PICTURE SIZE IS TOO LARGE TO BE PRINTED
          SCREEN ACTIVE AREA REDUCED TO MAKE PRINTOUT FIT

CHECK PICTURE WITH VIEW OPTION, RE-SPECIFY SIZE IF NECESSARY
```

This means that IMAGE PRINTER has automatically made your picture
'fit.' Since you may not like the result, you are asked to check
your 'window' with the 'View' command and re-specify either the
size, plot mode, or picture active area, as appropriate.

After 'cropping' the picture you automatically enter 'View' mode.
Here, you are shown the final plot size when your picture is
printed, and you can visually verify that the active HIRES screen
area selected is indeed correct.

6.0 Hires Picture Editing Command

6.1 Option A: Annotate (add text to) Picture

Text can easily be added to any HIRES picture. The entire ASCII
character set is available, including upper and lower-case
letters, numbers, special characters, and a variety of mathema-
tical symbols such as the square root sign and +/- sign.

Text can be placed on the screen in three 'angles': 1) Normal
(left-to-right), 2) Down (top-to-bottom), and 3) Up (bottom-to-
top). The Annotate Option begins with this display:

```
SET TEXT ANGLE? N=NORMAL D=DOWN U=UP ?
SET TEXT START POINT VIA GRAPHIC CURSOR

USE I/J/K/M, 'CTRL' I/J/K/M & L/R/U/D/C
KEYS TO MOVE THE GRAPHICS CURSOR 1 & 10
SCREEN DOTS & TO SCREEN MARGINS

TYPE   P   FOR GRAPHICS CURSOR 'PICK'
(SAME AS 'WINDOW PICTURE' OPTION W)

MOVE TEXT CURSOR UP    'CTRL' O
            LEFT  'CTRL' H ( <-- )
            RIGHT 'CTRL' U (--> )
            DOWN  'CTRL' L

'CTRL' S:TOGGLE UPPER/LOWER CASE CHARS
'CTRL' A:SELECT ALTERNATE CHARACTER SET
         (USE A-Z,1-5,()<>/'-!#+ KEYS)
'CTRL' G:BRING UP THE GRAPHICS CURSOR
'CTRL' R:SELECT CHARACTER ROTATION
'ESC'   :RETURN TO MAIN MENU
```

After selecting the angle for the text, you must now pick the
location of where the text is to begin. This is done on the HIRES
screen using a graphics 'cursor', as described in Section 2.5,
Using The Graphics Cursor. Use the 'P' key to pick the location.

You are now in 'enter text mode.' Each character that you type is
printed on the screen, and the cursor moves over one character
width, ready for the next character. The cursor changes shape to
reflect the 'case' that you are in. The upper-case 'text cursor'
is an inverse white block, an underline (_) for lower case, and
an up caret (^) for the 'alternate' character set.

You can 'toggle' between UPPER and lower-case letters by typing
CTRL-S, and you can select the 'alternate' character set by
pressing CTRL-A. When using the alternate character set, only the
letters A-Z, the numbers 1-5, and the keyboard special characters
()<>/'-!#+ are used. Each has its own unique symbol. To best
understand how the various character sets work, experiment a
little. Remember, you are asked if the altered picture is OK or
not before your text is added permanently.

While you are typing in text, several other Control characters
are available, including CTRL-O (to go 'up' a line), CTRL-H (the
left arrow, to backspace), CTRL-U (the forward arrow, to forward
space), and CTRL-L (to go 'down' a line). If you want to add text
at another location on the screen, you can bring up the graphics
cross-hair again by typing a CTRL-G. You can even select a new
text angle by pressing a CTRL-R.

All of 'text cursor' moves (CTRL-O, H, U, and L) are 'non-
destructive', meaning that the cursor passes over text and
picture without modifying either. You will find that colored
backgrounds do not take text material well. In those cases, use
the Color Fill command (Option F) to 'fill' in a black area
before adding the text string.

When you have finished annotating your picture and wish to return
to the Main Menu, press the 'ESC' key.

6.2 Option B: Form a Line Box on the Picture

You can add a border or box around an area of your picture in any
of seven standard colors and one 'reverse' color with Option B.
The colors available are the 'normal' Apple HIRES colors BLACK1,
GREEN, VIOLET, WHITE1, BLACK2, ORANGE, BLUE, and WHITE2. A
special 'INVERSE' color is also available which 'reverses' any
color on your picture that the line box is drawn over. A sub-menu
of colors allows you to pick any of the eight available colors
with just one keystroke. If desired, you can press the 'RETURN'
key to accept the last entered value or press 'ESC' to signal
quit and return to the Main Menu.

After a color is selected, opposite corners of the desired box
are 'picked' with a 'P' using the graphics cursor. For more
information on how the graphics cursor works, consult Section
2.5, Using The Graphics Cursor.

6.3 Option C: Compress Picture now in Memory

This Option 'shrinks' a HIRES picture to one half normal size
horizontally and vertically (one fourth the original area). Many
creative effects can be made by reducing the size of a HIRES plot
to be printed with IMAGE PRINTER using the 'Compress' Option.

When executing this feature, you are asked the seemingly strange
question **DENSITY FACTOR (1 TO 4)?**. This deals with the way the
'shrink' method works. In essence, four HIRES 'pixels' (dots on
the screen) must be compressed into one--hence the one fourth
area reduction. The algorithm used checks to see if at least
'density factor' white or colored dots exist within each group of
four (two dots wide and two rows deep). If enough pixels are 'on'
then a dot is plotted in the reduced picture, otherwise it is
left black.

'Line' drawings such as X-Y plots or sketch outlines are
'compressed' with little loss of resolution. For these, the
standard density factor of two should be used. But, for 'inverse'
(white on black) pictures and those with many vivid colors, a
factor of two generally does not give good results. Unfortu-

nately, most multi-colored pictures are converted to black-and-white by the process.

When asked for 'density factor' press the 'RETURN' key to signify that the standard value of two is OK, or type a single digit from one to four as an alternate choice. The compressed picture begins forming at once and you immediately see if the factor you have used has resulted in a good plot.

After the 'shrink' process is completed, you are asked if it is acceptable with the question 'OK? Y/N'. If you like the compressed drawing, answer 'Y'. This makes the reduced image permanent, thus replacing whatever full-size picture you were working with. Answering 'N' or 'ESC' return you to the Main Menu for your next choice.

Try the Compress feature with several different 'density factors' to see which one is best. Some pictures compress well, others just don't work at all. As a last suggestion, you may wish to try converting a picture to its 'inverse' using Option I before trying to reduce it. Experiment a little. As long as you say 'N' to the 'OK? Y/N' question, you can keep trying as many times as you like.

6.4 Option F: Color Fill a Picture Area

This command is used to fill in a rectangular area of a HIRES picture in any 'standard' Apple (BLACK1, GREEN, VIOLET, WHITE1, BLACK2, ORANGE, BLUE, and WHITE2) plus the special 'color' INVERSE. Using INVERSE 'reverses' the color now on the screen to its opposite color, GREEN into ORANGE, for example. This is particularly useful for altering colors in one part of a picture while leaving the rest untouched (to 'reverse' the colors of an entire picture, use the 'I' command described later in this manual).

The 'Color Fill' feature works just like the 'Draw Box' command (Option B) except that the picked area is <u>filled</u> with color and not just bordered with lines. After picking a color by number (0 to 7 or 'X'), you are asked to choose opposite corners of the area to be filled using the graphics cursor. Pressing the 'P' key with the cursor on-screen picks a corner.

To speed up the process of filling multiple areas with color, the graphics cursor continues to 'come up' after each selected area is filled. Press 'ESC' to quit and prepare to return to the Main Menu.

A detailed description of the graphics cursor is available in Section 2.5, Using The Graphics Cursor.

6.5 OPTION I: INVERSE OF PICTURE NOW IN

IMAGE PRINTER's 'Inverse' command turns a HIRES picture into its 'negative' or 'inverse'. This means that any colors on the screen turns into their so-called 'complimentary' color.

For example, BLACK becomes WHITE, WHITE is changed to BLACK,
GREEN and ORANGE switch, and so forth. This can be a striking
effect. If you only want to 'reverse' part of a picture, you
should use the 'Fill Color' command, Option 'F'.

Immediately after the picture is turned into its 'Inverse', you
have an opportunity to view the results. If you don't like it,
just 'Inverse' it back again. Each use of the I Option reverses
the effects of the previous use.

>>>>> SPECIAL NOTE <<<<<

When preparing a picture for printing, be aware that BLACK areas
on the HIRES screen reproduces as plain WHITE on paper since
IMAGE PRINTER 'prints' black ink only for WHITE or COLORED areas
on the picture. White-on-black line drawings and sketches should
be printed in their 'normal' condition, while pictures with many
colors and most 'dithered' images (like those in the Apple Con-
tributed Volumes Slide Shows) should be converted to 'Inverse'.
Use the Inverse command to visually determine which way a par-
ticular plot or picture should look before starting a print.

6.6 Option L: Draw Free-Form Lines On Picture

You have already seen how you can add borders or colored-in areas
to your picture, and how you can add text descriptions easily to
a plot. Now, using the 'free-form' line drawing command, you can
actually create graphs and charts from scratch. Or, you can use
Option L to 'fix-up' or edit a picture by drawing in or deleting
out certain parts of a picture.

While not meant to replace sophisticated drawing programs such as
Apple Plot, color 'painting' programs such as Micro Painter, or
hardware drawing devices such as the Apple Graphics Tablet, IMAGE
PRINTER can be used as a mini-graphics system to draw, border,
fill, and annotate a picture, chart, or graph.

Actually using the Line Draw command is similar to the other line
and fill routines mentioned above except that here you can draw
lines in any direction, not just as rectangles. After choosing a
color (one of the standard Apple colors only; sorry, no Inverse)
you are immediately placed in graphics cursor mode.

To 'pick' a new point, press the 'P' key. The point selected
forms the end-point of a line from the last point picked (if
any). 'Blank' points are specified by pressing 'B'. This has the
effect of 'lifting' the color 'pen' and 'moves' the internal
plotting coordinates (without drawing a line) so that the next
point picked with a 'P' begins a new line segment. Note that
unlike the other graphics options, you do not press the Space Bar
between graphics picks. The graphics cursor is immediately re-
displayed, ready for another pick.

As in the other picture 'editing' commands described earlier, you
may exit at any time by pressing the 'ESC' key. Because the lines
you have drawn will permanently alter your picture, you are asked
if the changes are **OK? Y/N**. IMAGE PRINTER does not make the
changes if you signal 'N'(o) or 'ESC'.

6.7 Option T: Translate (Scroll) Picture

Many times it is convenient to change the composition of a
picture before printing it. You have seen how to edit a picture
by adding text, line borders, and color-filled areas. Now, using
the IMAGE PRINTER 'Translate' command, you can actually move a
picture around, vertically and horizontally, with respect to the
screen 'window' on your monitor or TV.

Option T is particularly useful to correct for slight alignment
or proportion errors made during a graphics tablet picture
'digitizing'. Or, you might want to edit a chart or graph by
moving it over on the page to insert a new label by one of the
axes of the plot.

As you have come to expect from IMAGE PRINTER, scrolling a
picture is done graphically. After selecting the 'T' command, you
see the display:

```
USE THE I/J/K/M KEYS TO SCROLL PICTURE

    I = UP     1 LINE
    J = LEFT   7 PIXELS (COLOR SHIFT)
    K = RIGHT  7 PIXELS (COLOR SHIFT)
    M = DOWN   1 LINE

PRESS ESC KEY TO QUIT & RETURN TO MENU
PRESS SPACE BAR KEY TO BEGIN
```

After pressing the 'SPACE BAR' to go the HIRES screen and look at
your picture (an 'ESC' 'quits' the Option and returns you to the
Main Menu), you can begin 'scrolling' the picture. As you will
see, the process is a so-called 'circular' scroll, meaning that
when a line is 'pushed' off the top of the picture, for example,
it is 'wrapped' around and replaced at the bottom of the picture.
Thus, any movement can be reversed, if desired, to regain the
starting position of the picture.

Vertical picture movement is one HIRES 'line' at a time. You may
use the 'REPT' key and 'I' or 'M' to move up or down rapidly.
Horizontal picture movement is in increments of seven HIRES
'pixels' (dots), and is accomplished by pressing the 'J' key to
scroll left or the 'K' key to move right. Because of how Apple
HIRES colors work, side-ways scrolls of seven picture 'dots'
cause a color 'shift' and the picture reverts to its 'inverse'.

This is not a problem since a color-shifted picture can easily be
'put back' by using the 'Inverse' command (Option 'I', described
earlier).

When you are done translating your picture, press the 'ESC' key
to exit. You can 'veto' the change made to your picture by
answering the 'OK? Y/N' question with 'N' or 'ESC'.

7.0 Other Image Printer Commands

7.1 Option X: Exit Image Printer (return to basic)

When you have finished printing and otherwise processing your
HIRES pictures, select Option X to exit IMAGE PRINTER and return
to normal Apple work. To guard against an accidental exit, you
are asked to verify your intent with the question: **'QUIT IMAGE
PRINTER NOW? Y/N'.**

The standard answer, obtained by pressing the 'RETURN' key, is
'N'. You must explicitly press the 'Y' key to exit, any other key
(including the 'ESC' key), is interpreted as NO.

Upon exiting with a 'Y' response, you will see the message:
'TYPE: GOTO 200 TO RE-START'. This is a 'warm-start' entry point
should you change your mind and desire to continue with IMAGE
PRINTER.

7.2 The Reset Key

If you accidentally press the RESET key while using IMAGE
PRINTER, you can recover easily. Just type 'GOTO 200', and the
program returns to the Main Menu.
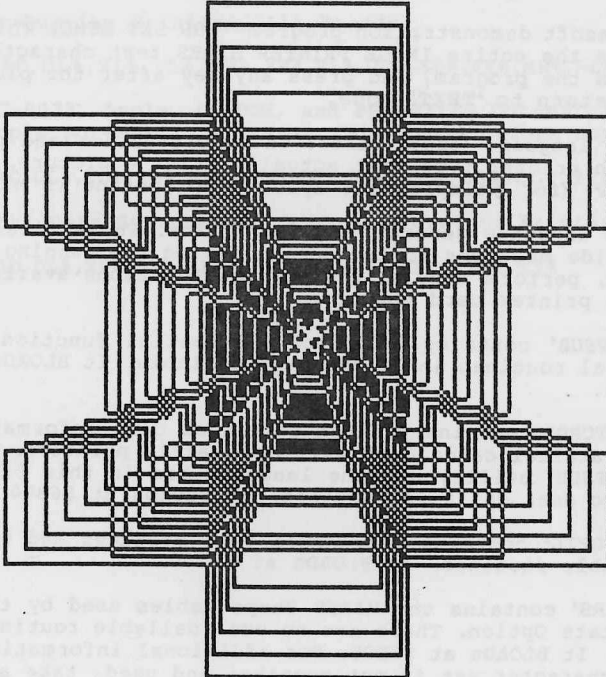
8.0 Appendix A. Advanced Programmer Information

8.1 What is on the Image Printer Disk

A number of Applesoft and 'binary' files are on the IMAGE PRINTER
System Disk. The files in the second part of the CATALOG are
HIRES pictures. Some are Public Domain pictures originally done
by Apple Computer, Inc. Others were 'digitized' using an Apple
Graphics Tablet. The files in the first part of the CATALOG are
the actual runnable parts of IMAGE PRINTER. They are in several
categories, described below.

Before beginning, remember **ALL** programs and files (with the
exception of the HIRES pictures) are Copyrighted and may **NOT** be
used in commercial programs that you or others may develop, nor
can any of the files or individual programs or routines be dis-
tributed to anyone, for any reason. The routines described in the
pages that follow are for your own personal use ONLY.

1. The 'hello' program 'I/P HELLO', is used to automatically load
   in required machine language support files, and to begin the
   set-up procedure.

2. The 'set-up' program itself, 'I/P SET-UP'.

3. Applesoft 'mainline' programs, all beginning with IMPRT- (for
   example, the Epson program is IMPRT-MX).

4. An Applesoft demonstration program--CHR SET DEMO. This program
   displays the entire IMAGE PRINTER HIRES text character set.
   Just RUN the program, and press any key after the picture is
   up to return to 'TEXT' mode.

5. Machine language 'dump' files. These are customized programs
   for each printer type that actually print a picture. All end
   in 'DUMP' (for example, the Epson dump routine is MXDUMP).

6. Machine language general 'support' files. These files are used
   to provide messages to the screen during the running of IMAGE
   PRINTER, perform many of the special functions available and
   provide printer card support.

   o 'IPSUPSUB' contains 'support' and special function routines.
     Several routines in it are user-callable. It BLOADs at
     $6000.

   o 'IPPRTCRD' contains printer interface card information for
     the Parallel cards used with dot-matrix printers. Several
     'IPSUPSUB' utility machine language are in this file, but it
     has no user callable routines. It BLOADs at $6B00.

   o 'IPMSGFIL' contains only ASCII text messages and has no user
     callable routines. It BLOADs at $7000.

   o 'IPCHRS' contains the HIRES Shape tables used by the
     Annotate Option. There are no user callable routines in this
     file. It BLOADs at $8E00. For additional information on how
     the character set is put together and used, take a look at
     Section 8.4 in this Appendix.

8.2 Calling Image Printer from an Applesoft Program

The machine language subroutines that support IMAGE PRINTER are
modular, thus allowing them to be called from an Applesoft
program, independent of the IMAGE PRINTER programs (IMPRT-xx).

Your program **MUST** BLOAD the appropriate 'dump' file (MXDUMP,
LQDUMP, etc.) at $6800, and the printer card file (IPPRTCRD) at
$6B00. You are responsible for 'protecting' the memory used by
these routines with appropriate use of HIMEM: and LOMEM:. These
files were not designed to be auto-relocating but you may
manually relocate them to another part of memory if needed. One
way to do this is with the Apple 'RELOCATE' program available as
part of the Programmer's Aid #1 package. Do **NOT** just do a 'memory
move'--it won't work!

Each printer type uses its own specialized Applesoft 'mainline'
program (IMPRT-xx). These programs are all the same with the
exception of printer-dependent code, such as printout size cal-
culations, and CALLing conventions. The section of the programs
devoted to the actual 'dump' is the range of line numbers 1000 to
1180. Typical calling sequences for several printer types are
listed below, with each variable in use explained separately.

1. Epson MX-Series Dot-Matrix Printers

    CALL AD,DL%,XL%,YL%,XH%,YH%,MR%,LF%,NP%,DB%,SL%,TY%

2. Letter-Quality Printers (All Brands)

    CALL AD,DL%,XL%,YL%,XH%,YH%,BL%,CO%,SZ%,PK%,MR%,SL%,TY%

3. NEC PC-8023, Apple, C.ITOH, and PROWRITER Dot-Matrix printers
   (If Apple Dot-Matrix Printer, CALL 26634 before next CALL)

    CALL AD,DL%,XL%,YL%,XH%,YH%,MR$,LF%,NP$,DB%,SL%,TY%

4. Integral Data Systems And Okidata Microline Printers

    CALL AD,DL%,XL%,YL%,XH%,YH%,MR%,LF%,DB%,SL%,TY%

AD - Address for 'dump' routine:
      AD = 26624 for horizontal plots, 26627 for vertical plots
DL% - Delay at end of each line, (0 to 127) (0 to 12.7 sec).
      Valid values are 0 to 127.
XL% - X-coordinate of left   'window' margin (X-small, 0-279)
XH% - X-coordinate of right 'window' margin (X-large, 0-279)
YL% - Y-coordinate of top   'window' margin (Y-small, 0-191)
YL% - Y-coordinate of bottom 'window' margin (Y-large, 0-191)
MR% - Left print margin in 1/10" characters. (All printers except
      NEC-type dot-matrix printers such as PC-8023, Apple, C.
      ITOH, Prowriter, etc.)
MR$ - Left print margin string (1/10" characters) in form "xxx".
      (For NEC-type dot-matrix printers only). To set a left
      margin of 15 (1.5") MR$ = "015".
LF% - Line-feed-after-carriage-return flag. LF after CR if LF% =
      1, no LF if LF% = 0. (Dot-matrix printers only)
DB% - Multi-size factor for Dot-matrix printouts. DB% = 1 for 1X
      plots, DB% = 2 for 2X plots, etc. The only valid values for
      DB% are those listed in the Option 'M' menus.
SZ% - Size number (1 to 6 valid) for Letter-Quality printouts.
NP% - Number of points to be plotted (non-NEC-type Dot-matrix).
      Vertical plots: NP% = (YH% - YL% + 1) * DB%. Horizontal
      plots: NP% = (XH% - XL% + 1) * DB%.
NP$ - Number of points to be plotted (string). Defined same as
      NP% above, but in string form "xxxx". To set 280 points,
      NP$ = "0280". (For NEC-type Dot-matrix printers only).
BL% - ASCII value of character to print for 'black' HIRES pixels
      (Letter-Quality) For example, to print a " " for 'black'
      pixels, BL% = 32.
CO% - ASCII value of character to print for 'color' pixels
      (Letter-Quality) To print a ".", CO% = 46.
SL% - Slot number of printer interface card (all printers).
TY% - Interface card type code. TY% = 0 is for user-written
      printer driver (file USER-DRIVER must be on disk). Non-zero
      values correspond to I/P SETUP menu (0 = A, 1 = B, etc.)
      and are for Dot-Matrix printers only. Letter-Quality
      printers use only 0 and 1.

      The last printed coordinate (X or Y depending on the plot-
      mode) is returned in TY%. This value may be used to decide
      how many LF's to print for a new 'TOF'. ALWAYS put the
      correct value in for TY% for each call.

IMPORTANT **NOTE:** ALL parameters in the CALLs to the IMAGE PRINTER
dump routines **MUST** be variables. Constants and expressions are
NOT allowed! Also, note that all variables are 'integer' (not
'real') variables with exception of the 'string' variables used
by the NEC-type printers. **NO** value range checking is performed by
the machine language routines (that is normally done in the
IMPRT-xx programs). If you pass an invalid value, at best you
will get incorrect results, at worst, you may 'crash' the Apple
system.

8.3 Useful Machine Language Routines Included

Many of the special utility routines used by IMAGE PRINTER (in
the IMPRT-xx mainlines) are general enough to be called from an
Applesoft user program. A list of these routines with their
calling address and input parameters is given here:

Your program MUST BLOAD the required files before CALLing any of
these routines. The files IPSUPSUB,A$6000 and IPPRTCRD,A$6800 are
ALWAYS required. If you intend to use the text annotation
routine, you must also BLOAD IPCHRS,A$8E00. As mentioned earlier,
your program MUST protect the area of memory used by these
routines with appropriate use of HIMEM: and LOMEM:.

o HIRES screen 'scroll' routine (called by Option 'T').

   Calling sequence: CALL 24576. Parameters: none.

   The scroll routine assumes you have turned HIRES graphics on.
   It ALWAYS uses the Page 1 screen. See the Option T documen-
   tation for details.

o HIRES picture 'compress' routine (called by Option C).

   Calling sequence: CALL 24579,DF%   where:

   DF% - 'Compress' 'Density Factor' (1 to 4)

   The compress routine assumes you have turned HIRES graphics on.
   It ALWAYS compresses whatever is in Page 2 onto the Page 1
   screen. See the Option C documentation for details.

o Fast HIRES screen move routine. Will very quickly move whatever
   is in Page 1 to Page 2 or vice versa.

   Calling sequence: CALL 24582,PS%,PD%   where:

   PS% - source HIRES screen address (high byte). To move FROM
          Page 1, PS% = 32. To move Page 2, PS% = 64.

   PD% - destination HIRES screen address (high byte). To move TO
          Page 1, PD% = 32. To move TO Page 2, PD% = 64.

o Get coordinates from HIRES screen using the HIRES 'cursor'.

   Calling sequence: CALL 24585,X%,Y%,RC%   where:

   X% - X-coordinate of cursor at time a pick ('P') is made.
   Y% - Y-coordinate of cursor at time a pick is made.
   RC% - Return code.

          On input: RC% tells the cursor routine if a 'blank' point
          ('B', as used in Option L) is OK (RC% = 3) and if a
          'full' command ('F') is OK (RC% <> 0). ALL cursor manip-
          ulation keys as defined in Options A, B, F, L, and W are
          valid. See documentation for details.

On <u>output</u>: RC% acts as a 'return code'. If the 'P' key is pressed, RC% = 0, if 'F' is pressed, RC% = 1. If the 'ESC' key is pressed, RC% = 2, and if 'B' is pressed, RC% = 3.

o Fast 'inverse' of entire screen (called by Option I). Routine ALWAYS does the inverse on Page 2.

Calling sequence: CALL 24588. Parameters: none.

o ONERR GOTO 'patch' as described on page 82 of the Applesoft Reference Manual.

Calling sequence: CALL 24594. Parameters: none.

o Prompt for proper answer. This is a very powerful routine, called from the IMPRT-xx programs via subroutines at lines 2100 (Y/N responses) and 2200 (any one-key response), attempts to return a real number result, V = VAL(V2$)).

The prompt routine prints a 'prompting' string, a 'default' answer (which is 'accepted' if the 'RETURN' key is pressed, and accepts only those key presses as are in a 'define' string. Using this routine, it is very easy to 'force' a user to type in acceptable (one character) values.

Calling sequence: CALL 24600,PR$,V1$,DF$,V2$ where:

PR$ - The 'prompt' string. May be a string literal (ex. "IS THIS OK"), a string variable, or a string expression (ex. CHR$(13) + "PROMPT").

V1$ - The 'default' value string. <u>MUST</u> be a string variable, ONE character long (ex. V1$ = "Y").

DF$ - The 'define' string of acceptable values. May be a string constant (ex. "ABCDE"), a string variable, or a string expression (ex. "123" + LEFT$(PP$,MX)). <u>ONLY</u> the characters in this string will be acceptable. <u>ALL</u> other responses will ring the bell (CHR$(7)) and be ignored.

V2$ - The 'response' value. <u>MUST</u> be a string variable, but may be the same one as used for V1$.

o Text 'annotation' (called by Option A). The annotation routine assumes you have called for HIRES graphics, and have set SCALE = 1, HCOLOR = 3, and ROT to either 0 ('Normal' text), 16 ('Down') or 48 ('Up'). NO other values are valid.

Calling sequence: CALL 24603,X%,Y%,RC%   where:

X% - X-coordinate (0-279) where text is to begin.
Y% - Y-coordinate (0-191) where text is to begin.
RC% - Return code. RC% = 1 if user has pressed CTRL-G (used in Option A to 'bring up' the HIRES cursor). RC% = 2 if the user has hit 'ESC', and RC% = 3 if user has pressed CTRL-R (used in Option A to signal a request for new text angle).

While in the actual annotation routine, all keys defined in the Option A documentation are valid, including CTRL-S ('shift' case) and CTRL-A ('alternate' character set).

o 'Ring' a 'soft' bell. This is the bell used in the cursor pick
and **'OK? Y/N'** parts of IMAGE PRINTER.

Calling sequence: CALL 24606. Parameters: none.

IMPORTANT NOTE: **ALL** parameters in the CALLs to the IMAGE PRINTER
dump routines **MUST** be variables. Constants and expressions are
NOT allowed (except as specifically noted). Also, note that all
variables are 'INTEGER' (not 'REAL') variables. **NO** value range
checking is performed by the machine language routines (that is
normally done in the IMPRT-xx programs). If you pass an invalid
value, at best you will get incorrect results, at worst, you may
'crash' the Apple system.

8.4 Organization of the Image Printer Character Set

The file 'IPCHRS', BLOADed at $8E00, contains HIRES SHAPES
defined for each character of the standard 96-character ASCII
set. The ASCII codes normally reserved for Control codes have
been re-defined as special mathematical symbols.

Since the IMAGE PRINTER characters are SHAPES, they can be
'ROTated', thus allowing different text angles. Theoretically,
they could be 'SCALE'd as well, but the characters do not look
'right' when larger than SCALE=1. Also, the best 'HCOLOR' is 3
(WHITE).

The SHAPE table is standard Applesoft. Thus, you could use the
IMAGE PRINTER character set in another program, at any address,
so long as the start-of-SHAPE pointers ($E8.E9, 232 and 233
decimal) are properly set. While no specific software to 'edit'
these characters is provided on the IMAGE PRINTER disk, any
routine you have to manipulate SHAPES will work (probably).

Should you wish to design your own SHAPE character set for IMAGE
PRINTER, keep in mind that a full 127 character SHAPE table is
required (or nasty things happen when doing text annotation with
Option A). Just BSAVE your file as 'IPCHRS' on the IMAGE PRINTER
disk (be sure to RENAME the original file before copying a new
one with the same name).

8.5 How to Write a Printer Driver Routine

Guide lines for user-written machine language printer driver
routines were given in Section 3.2 (The Hardware Set-up Program)
of this manual. This section explains more fully how such a
routine must be written to interface with IMAGE PRINTER.

A large number of popular printer interface cards are already
supported by IMAGE PRINTER. However, it is impossible to antic-
ipate every card coming to market and provide for software
support. If adequate documentation is provided with the printer
card you have, chances are a short driver routine can be written
to work with IMAGE PRINTER. Should you encounter difficulties
adapting your card, contact Sensible Software for assistance.

As stated earlier, a driver program MUST: 1) Be written in
machine language, 2) Reside in the memory range $300 to $3FF, 3)
Initialize the printer card used with a JSR $300, 4) Print a
character left on the 6502 stack via a JMP $303, and 5) Be
available on the IMAGE PRINTER disk under the name 'USER-DRIVER'.

Each IMAGE PRINTER 'dump' routine initializes the printer card
upon entry (if the card requires it) and pushes the character to
be printed onto the 6502 stack before calling a general 'print
character' subroutine. Your printer driver must emulate these
functions.

The IMAGE PRINTER built-in driver routines for dot-matrix
printers bypass the 'firmware' on any parallel card used to avoid
graphics characters being interpreted by the card as control
functions. Other functions performed include a 'purge' of all
data in a buffered card's memory if the user has 'ESCaped' to
quit a printout. But for letter-quality printers, IMAGE PRINTER
turns on the printer card with a 'PR#n' each 39 characters
printed (to avoid line length problems), and shuts the card off
at the end. Also, the letter-quality driver disconnects DOS going
in and re-connects it upon finishing.

CAUTION: All available 'Page Zero' addresses not already used by
Applesoft or DOS are used by IMAGE PRINTER. If your printer-
driver must use a Page Zero address to store data, you MUST
'save' the contents somewhere in the $300-3FF address space, and
restore the contents before your routine exits. Failure to comply
will result in poor results at best and a system 'crash' at
worst.

One Page Zero address which may be of interest is $A8, which
contains the printer card slot number as input in the 'dump'
statement with variable SL% (in the form $n0, where 'n' is the
slot number: $10 for slot=1, $20 for slot=2, etc.).

Drivers for the SSM APIO Parallel Card and the Apple Serial Card
are given as examples even though they are already supported.

```
 1  ;**********************************************************
 2  ;* SSM APIO Parallel Card Driver For Dot-Matrix Printers *
 3  ;**********************************************************
 4  ;
 5              ORG  $300            ;Driver MUST Be At $300
 6              OBJ  $800
 7  ;
 8  ;           E N T R Y   P O I N T S
 9  ;
10              JMP  INITCARD        ;Init The Card
11              JMP  PRTCHR          ;Print Char On Stack
12  ;
13  SLOT        EPZ  $10             ;Printer Card Slot #t #
14  ;                                (Slot #n0: 1=$10, 2=$20, Etc)
15  ;
16  OUTPORT     EQU  $C082           ;Output Port Address
17  STROBE      EQU  $C083           ;Strobe Set/Clear Address
18  ;
19  ;-----------------------------------------------------------
20  ; The Character To Be Printed Has Been Pushed On The 6502
21  ; Stack By The IMAGE PRINTER 'Dump' Subroutine
22  ;-----------------------------------------------------------
23  ;
24  PRTCHR      PLA                  ;Get Print Char
25              STA  OUTPORT,Y       ;Send char Out
26              LDA  #$34
27              STA  STROBE,Y        ;Issue strobe
28              LDA  #$3C
29              STA  STROBE,Y        ;Idle  strobe
30  APIOBUSY    LDA  STROBE,Y
31              BPL  APIOBUSY        ;Loop If Printer Busy
32              RTS                  ;End Of Output Subr.
33  ;
34  ;-----------------------------------------------------------
35  ; Initialization Routine Per SSM APIO Documentation Manual
36  ;-----------------------------------------------------------
37  ;
38  INITCARD    LDA  #2
39              STA  STROBE,Y        ;Set PIA Data Register
40              LDA  #$FF
41              STA  OUTPORT,Y       ;Set Port B Out
42              LDA  #$3C
43              STA  STROBE,Y        ;Idle Strobe
44              RTS                  ;End Of Init Subr
45  ;
46              END                  ;End Of Driver Routine
```

```
1  ;****************************************************
2  ;* Apple Serial Card Driver For Letter-Quality Printer *
3  ;****************************************************
4  ;
5             ORG $300              ;Driver MUST Be At $300
6             OBJ $800
7  OUTPORT    EQU $C200             ;Serial Card In Slot #2
8  ;                                (Does Not Include 'Handshaking')
9  ;
10 ;--------------------------------------------------
11 ;   INITIALIZATION SECTION
12 ;--------------------------------------------------
13 ;
14 INITCARD   RTS                   ;No Init For Serial Card
15            NOP
16            NOP                   ;Get PRTCHR At $303
17 ;
18 ;--------------------------------------------------
19 ; The Character To Be Printed Has Been Pushed On The 6502
20 ; Stack By The IMAGE PRINTER 'Dump' Subroutine
21 ;--------------------------------------------------
22 ;
23 PRTCHR     PLA                   ;Get Print Char
24            JMP OUTPORT           ;Send The Character
25            RTS                   ;End Of Output Subr.
26 ;
27            END                   ;End Of Driver Routine
```

9.0 Appendix B. Techniques for 'Capturing' Hires Pictures

High Resolution ('HIRES') graphics pictures can be created in a
variety of ways. Applesoft BASIC has extensive HIRES drawing
commands built in, as does Apple Pascal and Apple FORTRAN. In
addition, HIRES graphics is available for Integer BASIC and can
even be programmed in machine language.

Commercial software packages to create and manipulate graphic
images abound in the market place. Some are self-contained units,
while others can be 'called' from a user BASIC or machine code
program. Combined with hardware devices such as the Apple
Graphics Tablet or the Versa Writer tablet, special software
packages are available to do sketching and even limited forms of
computer-aided design (C.A.D.).

The one thing all these ways of creating graphic pictures have in
common is that they all must store the actual picture in the same
areas of the Apple's memory. A special block of memory running
from 8192 ($2000 Hexadecimal) to 24575 ($5FFF) is reserved for
High Resolution graphics. This memory block is split into two
halves, the so-called Page 1 HIRES screen ($2000-$3FFF, 8192 to
16383 decimal) and Page 2 screen ($4000-$5FFF, 16384 to 24575
decimal). You can define and store a picture in other areas of
the Apple's memory, but if you want to display a picture, it has
to be in either Page 1 or Page 2.

Other means of building pictures include games with exciting
displays and artwork, educational programs with graphic designs,
and business programs designed to perform graphical analysis of
data. Often these programs will let you 'save' a completed graph
or picture to one of your disks. But, many times 'protected'
games and other programs which illustrate beautiful 'logo'
pictures do not let you save them to disk.

However, since you (now) know where the pictures must be, other
means of 'capturing' the pictures can be explored. Perhaps the
easiest way to 'trap' a picture in memory is to run the program
which creates the image, then prematurely 'abort' the program by
intentionally 'booting' the Apple DOS system. Generally, this
method will work to 'save' pictures created in Pascal or FORTRAN,
and with games and other software which do not 'clear' memory to
prevent pirating their code.

To 'save' a picture this way, press the 'RESET' key or the 'CTRL'
key and 'RESET' key at the same time. This technique will for-
cibly stop the Apple and generally will return control to you in
BASIC. If you do not get direct control of your Apple, chances
are that the 'RESET' will cause a system 'boot'. Then, insert the
IMAGE PRINTER disk and let it 'boot' up. The start-up of DOS does
not by itself clear the portions of memory used by HIRES. Thus
the method of keeping graphics images by transferring between
Apple software systems as described here can be an effective,
though somewhat crude, means of capturing an otherwise unavail-
able picture.

If the program which creates the picture you want clears memory
or forces you to shut off your Apple to get back to standard
programming, there is not much that can be done. The Apple //e is
designed to facilitate this type of operation by having a special
'warm boot' procedure which automatically clears all memory to
zeros. But, for the majority of pictures you want to look at,
this type of thing should not be a problem.

The IMAGE PRINTER 'HELLO' program is designed to allow the
'capture' of any picture residing in HIRES Page 1 or 2. The
program 'I/P HELLO' has built-in functions to let you look at or
save these pictures to disk without having to run the main IMAGE
PRINTER program. And, rather than confuse you with a long series
of complicated 'POKES' which flip the Apple's hardware 'switches'
in order to look at a picture, a special program was written and
stored on the IMAGE PRINTER system disk. Called 'VIEW PICTURES',
this program emulates the operation of the 'I/P HELLO' program,
but in a smaller, self-contained package.

Feel free to try out the 'VIEW PICTURES' program, 'LIST' it out,
and modify it if you like. It is a quick and easy way to view
your pictures without a lot of confusion.

<div align="center">»»»HAPPY PRINTING«««</div>
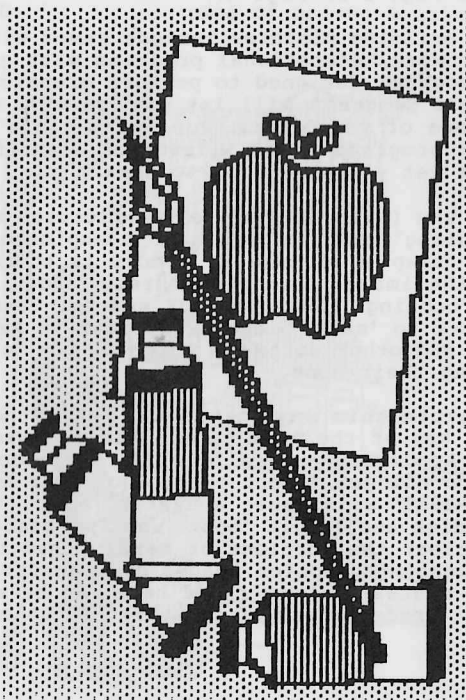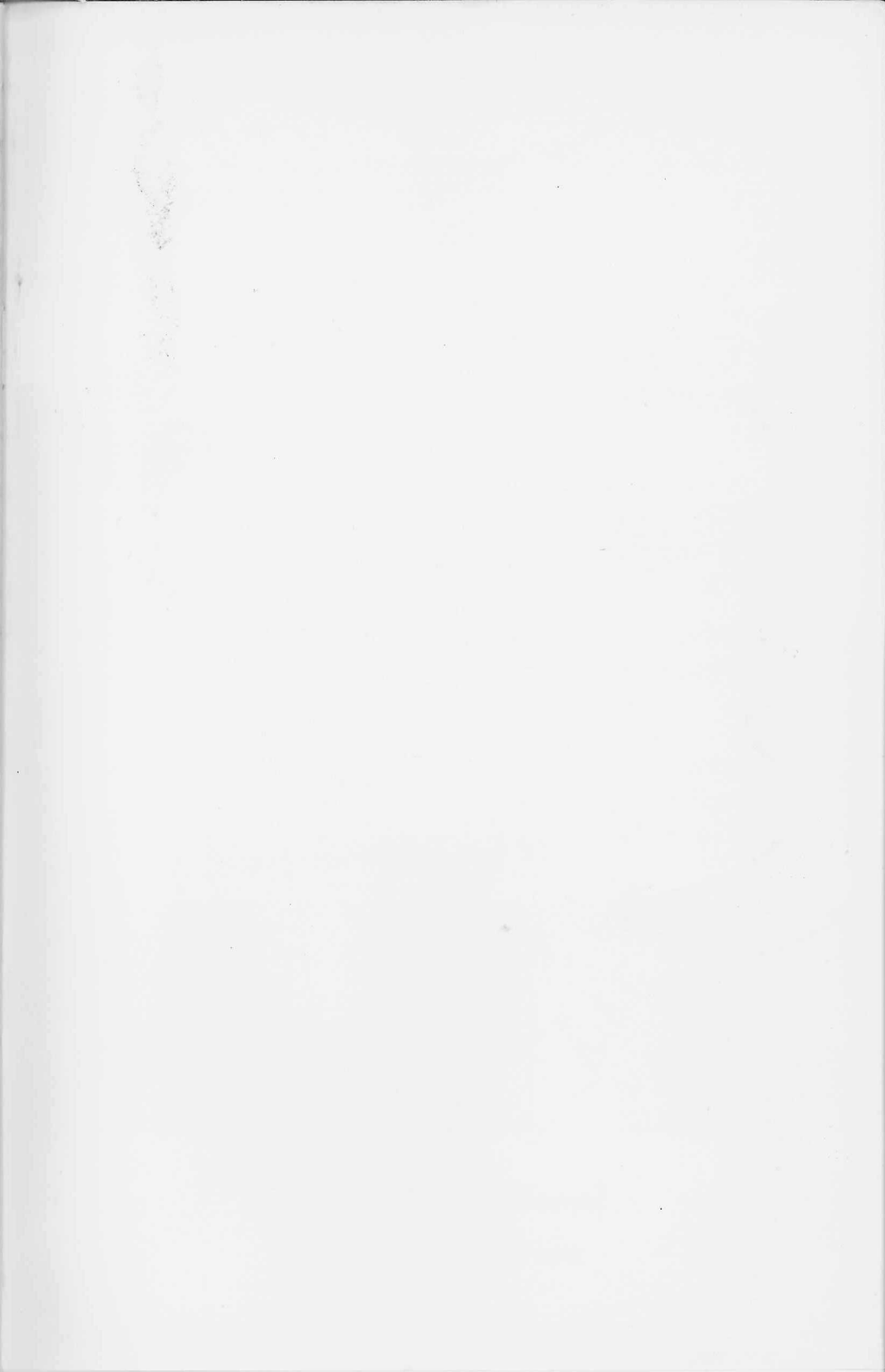
328-4000

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